Technical Memorandum No. 6: Economic Effects

Overview

This technical memorandum documents the results of the analysis of the potential economic effects of the Riffe Lake (Option 6) and the Windy Ridge (Option 12) option alignments. For baseline data and projections used to conduct the analysis, this memorandum draws upon:

- Technical Memorandum No. 2: Existing Conditions of Study Area Resources
- Technical Memorandum No. 3: Traffic Analysis
- Technical Memorandum No. 4: Current Economic Patterns and Trends

Potential economic effects fall into two basic categories: effects from economic impacts and economic efficiencies. Economic impact effects are of interest primarily to regional and local stakeholders. Employment is an important regional measure to these stakeholders and is measured by estimating the effects of tourism expenditure resulting from changes in the number of visitors. Effects from the two options evaluated a range from insignificant to minor effects.

The other category of economic effects, economic efficiency effects, are of interest primarily from a national perspective as a measure of the efficiency of investing national tax dollars in projects. Net Present Value (NPV) is an important measure of economic efficiency, measuring the difference between investment and operation and maintenance costs and user benefits. As typically calculated, the NPV is the difference between the Present Value of Benefits (NVB) and the Present Value of Costs (NVC), please refer to Table 1. There is a positive net benefit from Riffe Lake option under a high traffic assumption for providing access to both Randle and Cougar, and with a low traffic assumption to Randle. The Riffe Lake option with a low traffic assumption to Cougar, and the Windy Ridge option under all traffic assumptions, result in a negative net benefit for providing access to both Randle and Cougar. Although there is travel time savings, and thus benefit, for the Windy Ridge option, it is far too small to offset the cost of the option.

Table 1. Present Value Benefit (PVB), Present Value Cost (PVC), and Net Present Value (NPV) from User Benefits, by Option and Destination

	Randle (million $)			Cougar (million $)		
	PVB	PVC	NPV	PVB	PVC	NPV
Riffe Lake Option – Low	$63.1	$56.7	$6.4	$34.5	$56.7	-$22.2
Riffe Lake Option – High	$113.2	$56.7	$56.5	$61.5	$56.7	$4.8
Windy Ridge Option – Low	-$18.2	$56.8	-$75.0	$4.0	$56.8	-$52.8
Windy Ridge Option – High	-$33.4	$56.8	-$90.2	$6.5	$56.8	-$50.3

Economic Issues and Expectations

Through meetings and workshops, the following economic issues and expectations were developed by the Technical Advisory Committee (TAC), the Public Involvement Committee (PIC), and the public:

- Are communities prepared for growth?
- Community buy-in and support.
- Community, regional, state, federal, and economic gains and losses (assess economic development opportunities, not just tourism).
- Provisions for hotels, motels, and/or campgrounds along the route.
- Improved access—both public and private.
- Ownership (state, federal, and county).
- Impacts on private or public land ownership and management practices.
- Dumping, vandalism, fire hazards, and/or poaching.
- Land use limitations.
- Viewshed management.
- Improved law enforcement/emergency access (year-round).
- Federal government involvement in regulating state highways.
- Impact to scientific research associated with National Monument.
- "Build it and they will come."
- Need for continual (long-term) evaluation of how the road and supporting services serve the public.
- User fees for road and visitor center access.
- Funding options.
- Funding requirements for roadway support services.

- Funding for emergency assistance.
- Consideration of the project from a national perspective.

This list of economic issues and expectations provides a frame of reference for communicating to project analysts the interests and concerns of those that view themselves as stakeholders. Some are interested in the project as an economic growth stimulator. Others see growth as a two-edged sword and as a potential threat to values. With such conflicting points of view, community buy-in and support are vital. While tourism is seen by some as an important economic stimulus, others are concerned with a primary focus on tourism and want to see the effects assessed with a broader focus on economic development, a concern that the best investment opportunities for limited funds may be overlooked. Increases in tourism will carry with it a need for more tourism-related infrastructure such as motels, eating and drinking establishments, and service stations. Where these amenities will be located is of great concern to some local communities.

Improved access will have differential effects on all landowners, including federal, state, county, and local governments as well as private and business owners. It may lead to increased dumping and vandalism, create fire hazards, and encourage poaching, thereby imposing costs on these entities for protection. More public access may also increase demands for more regulation of public and private lands, placing limits on certain activities and land uses, limiting the degree of freedom and existing management options.

Some of these issues and expectations raised by the TAC, PIC, and the public are addressed in this economic analysis. Some must be reserved for future study (if warranted). Others point to questions that can only be answered by the communities themselves. Given the preliminary nature of this investigation, in-depth answers cannot be provided; however, it does not diminish the importance of these issues and expectations.

Methodology Used to Evaluate of Economic Effects

Economic effects fall into two basic categories: economic impact effects, and economic efficiency effects. Economic impact effects address the condition that effects of development are not spread equally across all segments of national, regional, and local populations. Some segments may bear a proportionally greater share of costs or receive a proportionally greater share of benefits. The economic impact analysis focuses primarily on the effects on regional and local economies. It is typically conducted using some type of modeling system involving the use of multipliers, such as input-output analysis. The IMPLAN input-output modeling system is used in this project to analyze economic equity effects. In both categories,

a with-project vs. without-project approach is used. The without-project condition is the present condition without the construction projected into the future and forms the baseline from which change (the with-project condition) attributed to the options is measured.

Economic efficiency effects address the magnitude of costs compared to the magnitude of benefits, without regard to the distribution of the benefits and costs. This type of analysis is frequently referred to as *benefit-cost analysis*. Central to a discussion of economic efficiency analysis is the calculation of Net Present Value (NPV). As typically calculated, NPV is the difference between the Present Value of Benefits (PVB) and the Present Value of Costs (PVC). Analysis of highways has typically focused on user benefits[1]. However, there are other costs and benefits beyond user benefits and construction and operating costs that are involved, as a variety of other resources are affected and the associated opportunity costs may be of considerable importance.

Some benefits and costs are readily quantified using existing market prices, which reflect opportunity costs. Other benefits and costs may be more difficult (and more expensive) to quantify. Some of these values can be quantified using economic techniques that infer or deduce values representative of those that may prevail if a market were present, such as some types of recreation. Where studies have been conducted to measure these values, they may be included in the calculation of PVB and PVC. Still other types of benefits and costs may not be possible to quantify with existing economic methodologies, such as the value of religious sites or genetic diversity.

Valuation of benefits and costs consists of two basic components, the establishment of value per unit of measure, and the establishment of the number of units involved. At the level of detail in which this project is conducted, there is very little opportunity to establish unit values or unit levels except for some very general engineering based parameters such as miles of road and travel times. Very little can be inferred from other parameters measured, such as acres of wetlands or acres of roadless areas. Therefore, at this level of detail the economic analysis cannot encompass all of the trade-offs involved into a single metric, but must leave to each interested party the task of weighing these tradeoffs based upon their own value system.

[1] See "A Manual on User Benefit Analysis of Highway and Bus-Transit Improvements," American Association of State Highway and Transportation Officials, 1977, and "Tourism Travel and Transportation System Development," NCHRP Report 419, Transportation Research Board, National Research Council, 1998.

Baseline

Study Area

The study area for the *SR 504 Feasibility Project* is comprised of five counties, Clark, Cowlitz, Lewis, Skamania, and Yakima. Data describing the current and past economic patterns of these five counties are presented in Technical Memorandum No. 4: Current Economic Patterns and Trends, and are summarized below.

Projections

The Washington State Office of Financial Management (OFM) has prepared population projections for each of the counties in the state. For this study, we have reviewed and are using the medium projections prepared by the OFM. This information was presented in Technical Memorandum No. 4: Current Economic Patterns and Trends.

Clark County

Employment in Clark County has been expanding rapidly in recent years. Total employment has grown consistently over the past three decades at over 4 percent. Past trends suggest that employment in Clark County will remain strong, with a steady growth rate over the next 20 years. The greatest growth and largest sector is expected to remain in the services sector.

Cowlitz County

Employment growth in Cowlitz County has averaged between one and two percent in the past 20 years. Recent trends have shown a shift from manufacturing to the services sector. Whereas manufacturing was the largest employment sector in 1990, services is expected to continue to surpass manufacturing in number of employees in the future.

Lewis County

Employment in Lewis County has grown slowly but steadily in past years, averaging between 1 percent to 2 percent growth overall. Future growth is anticipated to be concentrated in the retail trade and services sectors.

Skamania County

Employment in Skamania County has averaged between 1 percent and 2 percent in the past 10 years. Recent trends that show a shift in employment

from the manufacturing to services sector are expected to continue in the near future.

Yakima County

Yakima County has the largest agricultural base of the five counties, with farm employment and agricultural services comprising a significant share of total employment. Total employment in Yakima County has averaged between 1 percent and 2 percent annual growth over the past 20 years, while agricultural employment has experienced greater volatility in growth rates. Agricultural employment is expected to remain important, and retail trade and services are also expected to remain large employment sectors within the county.

Economic Impacts

Expenditure Patterns

The purpose of the SR 504 Extension Feasibility Study is to determine the economic, engineering, and environmental viability of connecting SR 504 to state and federal roads in the vicinity of the Mount St. Helens National Monument. One part of the economic viability is concerned with the potential impact that a connecting route might have on the economies of the five counties in the study area. Traveler expenditures, particularly those by tourists, are expected to be a major factor in any impacts.

To estimate these impacts, it is necessary to understand how travelers might spend money in the county. Forecasted changes in vehicle traffic resulting from an extension to SR 504 extension are used to forecast changes in number of visitors. To estimate total expenditure impacts, expenditure patterns per visitor are necessary. The Dean Runyan Associates (DRA)study,[2] discussed in Technical Memorandum No. 4, only provided total expenditure data, but does not provide a method of calculating expenditures per new visitor. Therefore, it was necessary to use data for expenditures per visitor collected in other areas as a basis for this understanding. Visitor expenditure data were obtained from a number of studies from the northwestern United States.[3] These data were reviewed for

[2] Dean Runyan Associates, *Washington State County Travel Impact 1993-1999*, prepared for the Washington State Office of Trade and Economic Development, Washington State Tourism, September 2000.

[3] Dean Runyan Associates and The Lyon Group, *Oregon Travel & Tourism - Visitor Profile, Marketing and Economic Impacts*, prepared for the Oregon Tourism Division, Dean Runyan Associates, Portland, Oregon, 1989; Morse, Kathleen, and Randall Anderson, *Tourism in the Columbia River Gorge*, Washington Sea Grant Marine Advisory Publication, University of Washington, Seattle, Washington, 1988; Shelby, Bo, Rebecca L. Johnson, and Mark Brunson, *Comparative Analysis of Whitewater Boating Resources in Oregon: Toward a Regional Model of River Recreation*, WRRI-108, Water

total expenditures by visitor (lodging) types and for major expenditure categories. The Southwestern Oregon Visitors Association study provides a rich database describing visitors to southwestern Oregon, where they go, what they do, what they buy, and how much they spend. The visitor expenditure data in this study provide the most comprehensive localized source identified in this effort. The southwestern Oregon area consists of Jackson and Josephine counties and is both alike and different from the study area. Like the study area, the southwestern Oregon area contains major tourist attractions, such as Crater Lake, the Oregon Shakespearean Festival, and others. Unlike the study area, it is not in proximity to major cities. It is expected that this proximity to major cities would result in a greater proportion of day use visitors, but the DRA study showed about half the proportion of day use as the southwestern Oregon study. Therefore, the southwestern Oregon data were used, along with the other data sources, to construct expenditure patterns. The expenditure (in 1997 dollars) by lodging type adopted for this study is presented in Table 2.

Table 2 Average Expenditures Per Visitor Per Day

Expenditure Category	Overnight Visitors by Lodging Choice			
	Camping	Hotel/ Motel	Friends/Relatives	Day Use
Lodging	$4.88	$29.16	$0.00	$0.00
Restaurants	$5.44	$18.70	$9.59	$6.21
Food	$4.32	$2.34	$3.48	$0.91
Gas/Auto	$5.59	$6.26	$4.54	$2.50
Recreation	$3.58	$4.96	$2.85	$0.66
Gifts	$2.43	$6.79	$9.58	$3.14
Total	**$26.24**	**$68.21**	**$30.04**	**$13.42**

Source: Reid, Rebecca L., *A Comparative Profile of Southwestern Oregon Visitors*, prepared for Southwestern Oregon Visitors Association, Southern Oregon Regional Services Institute, Southern Oregon State College, Ashland, Oregon, 1991. Updated to 1997 dollars using retail trade group chain-type price index for Gross Domestic Product, Bureau of Economic Analysis, U.S. Department of Commerce (website www.bea.doc.gov/bea/dn2/contribpr.html).

It is important to note that only those expenditures related to the activity of concern that actually occur in the impact area should be used for measuring impacts. This requires careful definition of the activity or activities of concern. For example, travel, as related primarily to tourism, must be explicitly defined so that it can be measured accurately. The purchase of airline tickets for travel by visitors to the region is not associated with regional tourism activity, as the expenditures occur outside the region.

Resources Research Institute, Oregon State University, Corvallis, Oregon, November, 1990, Reid, Rebecca L., *A Comparative Profile of Southwestern Oregon Visitors*, prepared for Southwestern Oregon Visitors Association, Southern Oregon Regional Services Institute, Southern Oregon State College, Ashland, Oregon, 1991.

The IMPLAN model is a "margined" model. In economic terminology, the model is in *producer* prices. This term comes from the wholesale and retail trade, where the difference between purchase price and selling price is called the "margin." In the IMPLAN system, the term also applies to other non-production costs, such as transportation and insurance, which are incorporated into the purchaser's price. Since retail sector expenditure data is expressed in terms of *purchaser* prices, it is necessary to separate out the margins to obtain *producer* prices.

Fortunately, these margins have been estimated for all IMPLAN commodities. Data on commodity margins for sectors 450[4] Food Stores, 451 Automotive Dealers and Service Stations, and 455 Miscellaneous Retail were examined. Average margins were estimated for the commodities in the sectors most commonly purchased by travelers. These are the primary margined sectors affected by visitor expenditures. Table 3 displays these margins.

Table 3. Average Margins for Selected Retail Sectors

Sector	Margin
450 Food Stores	0.18
451 Automotive Dealers and Service Stations	0.21
455 Miscellaneous Retail	0.26

Source: MIG, 1997 IMPLAN data

Transforming Expenditure Data into Direct Effects

To develop estimates of final demand (also referred to as direct effects), the expenditure data must first be categorized according to the appropriate IMPLAN sectors. For those retail sectors that are margined, the appropriate margin from Table 3 was applied. Table 4 shows the expenditure data in terms of the IMPLAN sectors and margins, where applicable.

Table 4. Expenditure Data by IMPLAN Sector

IMPLAN Sector	Overnight Visitors by Lodging Choice			Day Use
	Camping	Hotel/ Motel	Friends/ Relatives	
450 Food Stores	$0.78	$0.42	$0.63	$0.16
451 Automotive Dealers & Service Stations	$1.45	$1.63	$1.18	$0.65
454 Eating and Drinking	$5.44	$18.70	$9.59	$6.21
455 Miscellaneous Retail	$0.51	$1.43	$2.01	$0.66
463 Hotels & Lodging Places	$4.88	$29.16	$0.00	$0.00
488 Amusement & Recreation Services, N.E.C.	$3.58	$4.96	$2.85	$0.66
Total	**$16.64**	**$56.29**	**$16.26**	**$8.34**

[4] Sector numbers are included to make it easier for interested readers to find these sectors in a long list.

The next step in developing estimates of final demand is to create a single vector of final demand values for the IMPLAN sectors. To do this, the proportion of visitors in each lodging choice category must be estimated or a proportion assumed for each. *A Comparative Profile of Southwestern Oregon Visitors,* cited above, provides estimates of the number of visitors that camped, stayed in hotels or motels, stayed with friends or relatives, or were day use visitors. The Southwestern Oregon Study area is somewhat similar in size and has somewhat similar recreational activities as does the five-county study area for the SR 504 Extension Feasibility Study, including major attractions such as Crater Lake National Park and the Ashland Shakespearean Festival; therefore, the values from that study are assumed to be a reasonable approximation of what might be expected for the counties in our five-county study area. The proportions in these four lodging choice categories are shown in Table 5.

Table 5. Frequency Rates by Lodging Type

Lodging Type	Percent
Camping	16.62
Hotels/Motels	8.82
Friends/Relatives	6.79
Day Use	67.77

Source: Reid, Rebecca L., *A Comparative Profile of Southwestern Oregon Visitors,* prepared for Southwestern Oregon Visitors Association, Southern Oregon Regional Services Institute, Southern Oregon State College, Ashland, Oregon, 1991.

The frequency by lodging type is used together with the final demand values by lodging type to develop a single final demand vector by IMPLAN sector as shown in Table 6.

Table 6. Final Demand Vector by IMPLAN Sector

IMPLAN Sector	Weighted Final Demand Per Visitor Day
450 Food Stores	$0.32
451 Automotive Dealers & Service Stations	$0.91
454 Eating and Drinking	$7.41
455 Miscellaneous Retail	$0.79
463 Hotels & Lodging Places	$3.38
488 Amusement and Recreation Services, N.E.C.	$1.67
Total	**$14.49**

The next step is to estimate the number of visitors. This can be done by examining the number of vehicles moving throughout the area and the number of passengers in each vehicle. Estimates of average daily traffic were developed in Technical Memorandum No. 3: Traffic Analysis. The traffic analysis developed a range of traffic values, with the low end of the range being the low estimate, and the high end of the range being the high estimate. Table 7 presents the results of expanding these estimates from

average daily to average annual traffic (average daily traffic times 365 days).

Table 7. Estimated Additional Annual Vehicle Traffic Volumes in 2020

Alternative	Annual Vehicle Traffic
Riffe Lake option – Low	146,000
Riffe Lake option – High	255,500
Windy Ridge option – Low	91,250
Windy Ridge option – High	164,250

The Forest Service and the National Park Service rely on traffic counts to estimate the number of persons visiting Mount St. Helens and Mount Rainier. They use a factor for the number of people per vehicle times the vehicle count to estimate the number of visitors. The Forest Service used 2.8 people per vehicle for its 1999 estimates, while the National Park Service used 2.3 people per vehicle for its most recent estimates. The National Park Service value of 2.3 was used in this analysis as a conservative estimate. Calculations of the average annual number of visitors to the study area were based on this figure, and the average annual vehicle traffic volumes. Table 8 shows the results of these calculations.

Table 8. Estimated Additional Annual Visitors 2020

Alternative	Annual Visitors
Riffe Lake option – Low	335,800
Riffe Lake option – High	587,650
Windy Ridge option – Low	209,875
Windy Ridge option – High	377,775

The purpose here is to provide some information describing the range of effects counties might experience under the various options and traffic volume assumptions in the future. There are no data available that express how much of current traffic volume involves visitor stops and the expenditure of money in the individual counties, nor are there any data to project what the situation may be 20 years after development. Without intercept survey data to provide information about where tourists were stopping for lodging, fuel, and other expenditures, it is uncertain in which counties in the study area they may stop. It is unlikely that they will all stop in each county. To provide some information on individual county impacts, a range of capture potential by county is assumed, ranging from the low end at one percent (one vehicle in every hundred vehicles) to a high end of 20 percent (twenty vehicles in every hundred vehicles). Table 8 presents the results of applying these capture rates to each county. Thus a one percent capture rate implies that one visitor stops per 100 vehicles in each county or five visitors stop per 100 vehicles for the five counties combined. While different rates are likely to be obtained in the future for individual counties, this would depend substantially on the efforts within each county to attract and hold tourists. Therefore, no assumption was made about different potential for counties to capture.

Table 9. Estimate of Average Annual Number of Visitors Stopping and Spending at Three Capture Potentials

Alternative	Capture Rate		
	1%	5%	20%
Riffe Lake option – Low	3,358	16,790	67,160
Riffe Lake option – High	5,877	29,383	117,530
Windy Ridge option – Low	2,099	10,494	41,975
Windy Ridge option – High	3,778	18,889	75,555

These estimates of average annual number of visitors stopping were multiplied by the final demand value (in 1997 present value base year dollars) per visitor from Table 6 to obtain estimates of total final demand (in 1997 present value base year dollars) or the direct effect. These values are shown Tables 10 through 13.

Table 10. Final Demand Estimates: Riffe Lake – Low

IMPLAN Sector	1%	5%	20%
450 Food Stores	$1,074	$5,372	$21,486
451 Automotive Dealers &Service Stations	$3,042	$15,208	$60,831
454 Eating & Drinking Places	$24,893	$124,467	$497,867
455 Miscellaneous Retail	$2,666	$13,332	$53,329
463 Hotels & Lodging Places	$11,360	$56,800	$227,200
488 Amusement & Recreation, N.E.C.	$5,619	$28,094	$112,376
Total	**$48,654**	**$243,273**	**$973,089**

Table 11. Final Demand Estimates: Riffe Lake – High

IMPLAN Sector	1%	5%	20%
450 Food Stores	$1,880	$9,400	$37,601
451 Automotive Dealers & Service Stations	$5,323	$26,614	$106,454
454 Eating & Drinking Places	$43,563	$217,817	$871,267
455 Miscellaneous Retail	$4,666	$23,331	$93,325
463 Hotels & Lodging Places	$19,880	$99,400	$397,600
488 Amusement & Recreation, N.E.C.	$9,833	$49,165	$196,659
Total	**$85,145**	**$425,727**	**$1,702,906**

Table 12. Final Demand Estimates: Windy Ridge– Low

IMPLAN Sector	1%	5%	20%
450 Food Stores	$671	$3,357	$13,429
451 Automotive Dealers & Service Stations	$1,901	$9,505	$38,019
454 Eating & Drinking Places	$15,558	$77,792	$311,167
455 Miscellaneous Retail	$1,667	$8,333	$33,330
463 Hotels & Lodging Places	$7,100	$35,500	$142,000
488 Amusement & Recreation, N.E.C.	$3,512	$17,559	$70,235
Total	**$30,409**	**$152,046**	**$608,180**

Table 13. Final Demand Estimates: Windy Ridge – High

IMPLAN Sector	1%	5%	20%
450 Food Stores	$1,209	$6,043	$24,172
451 Automotive Dealers & Service Stations	$3,422	$17,109	$68,435
454 Eating & Drinking Places	$28,005	$140,025	$560,100
455 Miscellaneous Retail	$3,000	$14,999	$59,995
463 Hotels & Lodging Places	$12,780	$63,900	$255,600
488 Amusement & Recreation, N.E.C.	$6,321	$31,606	$126,424
Total	**$54,737**	**$273,682**	**$1,094,726**

Estimating the Indirect Effects and Induced Effects

These final demand or direct effect estimates are used with the input-output model, which contains a detailed description (528 sectors) of the total economy, to estimate the indirect and induced effects. The effects measured are employment, labor income, and total output by industry.

As a result of this analysis, a large quantity of detailed data can be displayed in a wide variety of formats. The appendix presents output, income, and employment estimates for major economic groups. The bulk of the impacts occur in the trade and services sectors. However, the general magnitude of impacts on each county can be indicated by demonstrating the overall effect on total employment for each county for the low and high ends of the ranges. The estimates assume that the full effect would be felt by each county alone, and thus cannot be summed to get a total effect. For the state estimate, it is assumed that the change in final demand will occur somewhere in the state. These results are summarized for each of the counties and the state in Table 14.

Table 14. Estimated Effects on Employment (Jobs) by County and Washington State

County	Low Impact (Jobs)	High Impact (Jobs)
Clark	2	55
Cowlitz	1	64
Lewis	1	67
Skamania	1	71
Yakima	1	66
Washington State	1	61

While there are some apparent inconsistencies in the modeling results, as employment impacts for the state are lower than some of the counties, the general conclusions about the impacts on county economies is clear. None of the options would appear to be significant generators of economic activity. The high impact estimates are all based upon the high range of assumptions and provide only a minimal number of jobs relative to total

employment for each county. The apparent inconsistencies between high range county impacts with the smallest county generating the most jobs and counties generating more jobs than the state, are due to differences in labor efficiency, or number of jobs per dollar of total output.

Economic Efficiency

As stated in Technical Memorandum No. 1: Project Definition, the need for connecting SR 504 with a state or federal road to the north, south, or east of the Mount St. Helens National Monument is the following:

- To improve economic development opportunities in the area surrounding the Mount St. Helens National Monument.
- To improve resident and visitor access in the area surrounding the Mount St. Helens National Monument.
- To provide a new shorter emergency medical and law enforcement response route.
- To provide a year-round emergency evacuation route.

The first item above is addressed in the economic equity analysis. The last three items relate to potential user benefits. The last two items were addressed in Technical Memorandum No. 5: Option Evaluation. As mentioned above, analysis of highways has typically focused on user benefits, and the procedures for measuring benefits and costs are described in, "*A Manual on User Benefit Analysis of Highway and Bus-Transit Improvements*," American Association of State Highway and Transportation Officials, 1977. The procedures described rely on benefit-cost analysis methods where an option is evaluated with respect to a "without project" baseline and costs and benefits are measured as changes from the "without" conditions. The major costs are those of construction and annual operation and maintenance.

As discussed above, in addition to these costs and benefits associated with the construction of the highway, other costs and benefits are associated with the change in opportunity costs of resources affected by the highway. The following sections address both the user- and non-user- related benefits and costs.

User-Related Benefits and Costs

The costs of a project generally fall into two categories; highway investment costs and highway maintenance and operation. The investment costs are up front, one-time costs that occur at the beginning of the construction period, typically over the first few years of the project. The maintenance and operation costs occur annually following completion of the construction. User benefits are generally measured in terms of a

decrease in user costs, with running costs, vehicle travel time, and traffic accident costs the principal sources of user benefits. Because these occur over a period of time, they must be brought back to a single point in time for comparison to be valid. This process is called discounting and the common point in time is usually a present value. For costs, this is called the Present Value of Costs (PVC), and for benefits, the Present Value of Benefits (PVB). The difference between PVB and PVC is referred to as Net Present Value (NPV). NPV is one measure of economic efficiency, with a positive NPV indicating that discounted benefits (PVB) exceed the discounted costs (PVC), and a negative NPV indicates that PVC exceeds PVB. The greater the value of NPV indicates higher economic efficiency. Economic efficiency can also be measured as the ratio between PVB and PVC, called the benefit-cost ratio, where values equal to or exceeding one are deemed to be economically efficient.

To perform the analysis, costs of construction, operation and maintenance (O&M), vehicle running, travel time, and traffic accidents must be identified. To calculate savings in running time costs, an estimate of vehicle composition (vehicle types or users) and the miles of various grades within a segment must be determined. This information was not developed at this level of analysis, so no estimate of this benefit (or disbenefit) was included. Likewise, no estimate of reduction in accident rates was made and no estimate of reduced (or increased) accident costs could be included. To conduct the discounting, a discount rate must be selected, the life of the project must be selected, and the remaining value of the facility at the end of the project life identified.

There are a number of points of view on what constitutes an appropriate discount rate, such as the social rate of time preference and the opportunity cost of capital. There is general agreement that a real (inflation free) rate should be used, not a nominal (current market) rate. The rate used for federal water project analysis, the so-called Water Resources Council planning rate, is a nominal (i.e., not adjusted for inflation) rate. The Forest Service analyzed long term real rates for use in its long-term planning economic analysis ("*Discount Rate for Long-Term Forest Service Investments,*" Clark Row, H. Fred Kaiser, and John Sessions, Journal of Forestry, June 1981) and concluded, "On the basis of these data and analysis, the Forest Service has adopted a slightly conservative recommendation to use a 4 percent discount rate in long-term land and resource planning." The Washington Department of Transportation uses a 4 percent real rate. A 4 percent discount rate is used in this analysis.

The analysis period is typically set at the expected life of the project. For well-constructed and well-maintained roads, this can be a very long time. For highway projects, a shorter time period is usually selected. For this analysis, the analysis period is set at 30 years, the design life of the road. The residual value reflects the difference between the design life of the

road and the design life of structures, such as bridges. The design life of structures was 50 years, with the residual value of structures set at two-fifths of the initial cost of the structures.

Capital costs were estimated to be $44 million for the Riffe Lake option and at $41 million for the Windy Ridge option. The annual O&M costs were estimated at $1 million for the Riffe Lake option and $1.2 million for the Windy Ridge option. Capital costs were assumed to be spread equally over the first three years and O&M costs to occur annually beginning in the fourth year. Costs estimates were based upon constructing the options to the AASHTO standard for mountainous terrain collectors. Details concerning how the capital and O&M cost estimates were derived can be found in Technical Memorandum No. 8: Further Evaluation. This standard was recently used to construct the new Curly Creek Forest Service road located in Skamania County. Building the options to a higher standard, such as a state highway, could potentially quadruple the costs of construction and significantly increase the O&M cost. Yet, user benefits would not dramatically increase if a higher roadway standard were assumed.

Travel time costs were estimated at $10 per hour on an opportunity cost basis. Table 7 above provides an estimate of additional annual visitors. A maximum benefit assumption is used, in which the visitors in each option would travel from Coldwater Visitors Center to either Cougar or Randle. While it is likely that not all visitors will do this, the proportion that will is not known. Changes in estimated travel times from the Coldwater Visitor Center are shown in Table 15.

Table 15. Travel Times (in minutes) from Coldwater Visitor Center With Project and Without Project Options

Destination	Without Project	With Project		Difference	
		Riffe Lake Option	Windy Ridge Option	Riffe Lake Option	Windy Ridge Option
To Randle	123	47	81	-76	-42
To Cougar	123	159	116	36	-7

Both option alignments to Randle and the Windy Ridge option to Cougar, result in reduced travel time and thus a benefit provided. Only the Riffe Lake option to Cougar results in an increase in travel time over the baseline of no project. The Riffe Lake option to Randle provides annual benefits with the high traffic assumption of $7.4 million and a NPV of $57 million, and with the low traffic assumption of $4.3 million and a NPV of $6 million. The Riffe Lake option to Cougar, under the high traffic assumption, provides annual benefits of $4 million and a NPV of $5 million. For all other combinations (the Riffe Lake option under low traffic assumption to Cougar, and the Windy Ridge option under both high and low traffic assumptions, for both destinations) the NPV is negative.

The time savings gained for the Windy Ridge option result in far too little benefit to offset the cost of the option. It is unlikely, if running time costs and accident costs were included, that these values would change the NPV for these combinations from negative to positive.

Table 16. Present Value Benefit (PVB), Present Value Cost (PVC), and Net Present Value (NPV) from User Benefits, by Option and Destination

	Randle (million $)			Cougar (million $)		
	PVB	PVC	NPV	PVB	PVC	NPV
Riffe Lake Option – Low	$63.1	$56.7	$6.4	$34.5	$56.7	-$22.2
Riffe Lake Option – High	$113.2	$56.7	$56.5	$61.5	$56.7	$4.8
Windy Ridge Option – Low	-$18.2	$56.8	-$75.0	$4.0	$56.8	-$52.8
Windy Ridge Option – High	-$33.4	$56.8	-$90.2	$6.5	$56.8	-$50.3

Non-User-Related Benefits and Costs

When evaluated from the point of view of user benefits, the Riffe Lake option under the high traffic assumption is the only option that meets an economic efficiency criterion. However, as pointed out above, not all of the benefits and costs have been included in this calculation. As discussed in Technical Memorandum No. 5: Option Evaluation, the effect on other resources can result in both benefits and costs. For example, increased access could provide benefits to local resident travel, public and private land management, public safety, recreation activities, and to monument attractions. On the other hand, the same increased access could impose costs for landowners for protection of their holdings, increased costs for public safety, and for protecting resource values. While increased access may make it easier for some members of the public to reach locations that they formerly would not have been able to enjoy, the fact that they may reduce the value of the resource to other members of the public who valued the solitude that was protected by the former lack of access. Given the preliminary nature of this investigation, the measurement of such issues in detail was not possible.

Summary

Four needs were set forth for connecting SR 504 with a state or federal road to the north, south, or east of the Mount St. Helens National Monument. One need is to improve economic development opportunities in areas surrounding the monument. The potential for increased tourism impacts in the five counties in the impact area was assessed under a range of assumptions. At the low range of assumptions, very small impacts were projected in terms of jobs (1 to 2 jobs for each county). At the high range of assumptions, larger impacts were projected in terms of jobs (55 to 71 jobs for each county). However, even at the high range of assumptions, the number of jobs supported by increased tourism is modest in terms of the

total employment existing currently in each county. To generate these jobs, businesses in each county would have to attract one visitor in five to the county.

A second need is to improve resident and visitor access to the area surrounding the monument. The potential for meeting this need in an economically efficient manner was assessed in a benefit cost analysis, comparing the capital costs for building the road and the annual O&M costs with the benefits to users measured in terms of changes in travel times and the opportunity cost of the potential savings in time. There is a positive net benefit from the Riffe Lake option under a high traffic assumption for providing access to both Randle and Cougar. The Riffe Lake option to Cougar with a low traffic assumption and the Windy Ridge option under all traffic assumptions result in a negative net benefit for providing access to both Randle and Cougar. Although there is travel time savings, and thus benefit, for the Windy Ridge option, it is far too small to offset the cost of the option.

It should be noted that all possible needs were not evaluated in this analysis. Other needs, such as providing improved access to specific attractions or sites, may provide additional benefits and costs. Given the preliminary nature of this investigation, such issues must remain unexamined; however, the fact that they have not been addressed at this point is not an indication that they may be unimportant.

Appendix: Impact Reports

Clark County — Estimated Impacts

Option 6 - Low Traffic
(1% capture rate)

	Output		Labor Income		Employment	
Industry	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Agriculture	$0	$370	$0	$145	0	0
Mining	$0	$1	$0	$0	0	0
Construction	$0	$1,113	$0	$607	0	0
Manufacturing	$0	$1,783	$0	$413	0	0
Transport., Commun., Public Utilities	$0	$2,008	$0	$622	0	0
Trade	$30,888	$35,668	$11,649	$13,716	1	1
Finance, Insurance, Real Estate	$0	$5,968	$0	$923	0	0
Services	$16,979	$24,161	$6,888	$10,531	0	1
Government	$0	$1,570	$0	$423	0	0
Other	$0	$19	$0	$19	0	0
TOTAL	**$47,867**	**$72,661**	**$18,537**	**$27,399**	**1**	**2**

Option 6 - Low Traffic
(20% capture rate)

	Output		Labor Income		Employment	
Industry	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Agriculture	$0	$7,404	$0	$2,895	0	0
Mining	$0	$21	$0	$8	0	0
Construction	$0	$22,254	$0	$12,141	0	0
Manufacturing	$0	$35,660	$0	$8,251	0	0
Transport., Commun., Public Utilities	$0	$40,161	$0	$12,441	0	0
Trade	$617,764	$713,367	$232,986	$274,315	18	20
Finance, Insurance, Real Estate	$0	$119,363	$0	$18,457	0	1
Services	$339,576	$483,224	$137,761	$210,613	6	9
Government	$0	$31,403	$0	$8,464	0	0
Other	$0	$370	$0	$370	0	0
TOTAL	**$957,340**	**$1,453,227**	**$370,747**	**$547,955**	**25**	**31**

Option 6 - High Traffic
(1% capture rate)

	Output		Labor Income		Employment	
Industry	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Agriculture	$0	$648	$0	$253	0	0
Mining	$0	$2	$0	$1	0	0
Construction	$0	$1,947	$0	$1,062	0	0
Manufacturing	$0	$3,120	$0	$722	0	0
Transport., Commun., Public Utilities	$0	$3,514	$0	$1,089	0	0
Trade	$54,054	$62,419	$20,386	$24,002	2	2
Finance, Insurance, Real Estate	$0	$10,444	$0	$1,615	0	0
Services	$29,713	$42,282	$12,054	$18,429	1	1
Government	$0	$2,748	$0	$741	0	0
Other	$0	$32	$0	$32	0	0
TOTAL	**$83,767**	**$127,156**	**$32,440**	**$47,946**	**2**	**3**

Option 6 - High Traffic
(20% capture rate)

	Output		Labor Income		Employment	
Industry	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Agriculture	$0	$12,957	$0	$5,066	0	0
Mining	$0	$37	$0	$14	0	0
Construction	$0	$38,944	$0	$21,247	0	1
Manufacturing	$0	$62,403	$0	$14,439	0	0
Transport., Commun., Public Utilities	$0	$70,280	$0	$21,771	0	1
Trade	$1,081,056	$1,248,358	$407,715	$480,040	32	35
Finance, Insurance, Real Estate	$0	$208,881	$0	$32,299	0	1
Services	$594,259	$845,640	$241,082	$368,570	11	16
Government	$0	$54,954	$0	$14,812	0	0
Other	$0	$648	$0	$648	0	0
TOTAL	**$1,675,315**	**$2,543,102**	**$648,797**	**$958,906**	**43**	**55**

Clark County (continued)

Option 12 - Low Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$447	$0	$193	0	0
Mining	$0	$1	$0	$1	0	0
Construction	$0	$1,565	$0	$857	0	0
Manufacturing	$0	$2,154	$0	$542	0	0
Transport., Commun., Public Utilities	$0	$2,539	$0	$764	0	0
Trade	$19,305	$24,867	$7,281	$9,702	1	1
Finance, Insurance, Real Estate	$0	$7,721	$0	$1,131	0	0
Services	$42,612	$52,693	$15,563	$20,650	2	2
Government	$0	$2,097	$0	$580	0	0
Other	$0	$23	$0	$23	0	0
TOTAL	**$61,917**	**$94,107**	**$22,844**	**$34,443**	**2**	**2**

Option 12 - Low Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$4,628	$0	$1,809	0	0
Mining	$0	$13	$0	$5	0	0
Construction	$0	$13,909	$0	$7,588	0	0
Manufacturing	$0	$22,287	$0	$5,157	0	0
Transport., Commun., Public Utilities	$0	$25,100	$0	$7,776	0	0
Trade	$386,102	$445,854	$145,616	$171,447	11	13
Finance, Insurance, Real Estate	$0	$74,602	$0	$11,536	0	1
Services	$212,235	$302,015	$86,101	$131,633	4	6
Government	$0	$19,627	$0	$5,290	0	0
Other	$0	$231	$0	$231	0	0
TOTAL	**$598,337**	**$908,266**	**$231,717**	**$342,472**	**15**	**20**

Option 12 - High Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$416	$0	$163	0	0
Mining	$0	$1	$0	$0	0	0
Construction	$0	$1,252	$0	$683	0	0
Manufacturing	$0	$2,006	$0	$464	0	0
Transport., Commun., Public Utilities	$0	$2,259	$0	$700	0	0
Trade	$34,750	$40,128	$13,106	$15,431	1	1
Finance, Insurance, Real Estate	$0	$6,714	$0	$1,038	0	0
Services	$19,101	$27,181	$7,749	$11,847	0	1
Government	$0	$1,766	$0	$476	0	0
Other	$0	$21	$0	$21	0	0
TOTAL	**$53,851**	**$81,744**	**$20,855**	**$30,823**	**1**	**2**

Option 12 - High Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$8,330	$0	$3,257	0	0
Mining	$0	$24	$0	$9	0	0
Construction	$0	$25,036	$0	$13,659	0	0
Manufacturing	$0	$40,117	$0	$9,282	0	0
Transport., Commun., Public Utilities	$0	$45,181	$0	$13,996	0	0
Trade	$694,984	$802,538	$262,110	$308,605	20	23
Finance, Insurance, Real Estate	$0	$134,283	$0	$20,764	0	1
Services	$382,024	$543,629	$154,981	$236,940	7	10
Government	$0	$35,328	$0	$9,522	0	0
Other	$0	$417	$0	$417	0	0
TOTAL	**$1,077,008**	**$1,634,883**	**$417,091**	**$616,451**	**28**	**35**

Cowlitz County — Estimated Impacts

Option 6 - Low Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$756	$0	$286	0	0
Mining	$0	$1	$0	$0	0	0
Construction	$0	$1,142	$0	$655	0	0
Manufacturing	$0	$1,157	$0	$313	0	0
Transport., Commun., Public Utilities	$0	$2,150	$0	$666	0	0
Trade	$31,675	$36,012	$12,088	$13,971	1	1
Finance, Insurance, Real Estate	$0	$5,156	$0	$732	0	0
Services	$16,979	$23,651	$6,199	$9,518	1	1
Government	$0	$1,235	$0	$398	0	0
Other	$0	$30	$0	$30	0	0
TOTAL	**$48,654**	**$71,290**	**$18,287**	**$26,569**	**2**	**2**

Option 6 - Low Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$15,114	$0	$5,724	0	0
Mining	$0	$29	$0	$10	0	0
Construction	$0	$22,834	$0	$13,098	0	0
Manufacturing	$0	$23,137	$0	$6,260	0	0
Transport., Commun., Public Utilities	$0	$42,996	$0	$13,322	0	0
Trade	$633,513	$720,245	$241,768	$279,428	19	21
Finance, Insurance, Real Estate	$0	$103,129	$0	$14,637	0	1
Services	$339,576	$473,010	$123,982	$190,369	10	13
Government	$0	$24,695	$0	$7,963	0	0
Other	$0	$609	$0	$609	0	0
TOTAL	**$973,089**	**$1,425,798**	**$365,750**	**$531,420**	**29**	**37**

Option 6 - High Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$1,322	$0	$501	0	0
Mining	$0	$3	$0	$1	0	0
Construction	$0	$1,998	$0	$1,146	0	0
Manufacturing	$0	$2,024	$0	$548	0	0
Transport., Commun., Public Utilities	$0	$3,762	$0	$1,166	0	0
Trade	$55,432	$63,021	$21,155	$24,450	2	2
Finance, Insurance, Real Estate	$0	$9,024	$0	$1,281	0	0
Services	$29,713	$41,388	$10,848	$16,657	1	1
Government	$0	$2,161	$0	$697	0	0
Other	$0	$53	$0	$53	0	0
TOTAL	**$85,145**	**$124,756**	**$32,003**	**$46,500**	**3**	**3**

Option 6 - High Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$26,449	$0	$10,017	0	0
Mining	$0	$51	$0	$17	0	0
Construction	$0	$39,960	$0	$22,921	0	1
Manufacturing	$0	$40,490	$0	$10,954	0	0
Transport., Commun., Public Utilities	$0	$75,244	$0	$23,313	0	1
Trade	$1,108,647	$1,260,428	$423,093	$488,999	34	37
Finance, Insurance, Real Estate	$0	$180,476	$0	$25,615	0	1
Services	$594,259	$827,769	$216,969	$333,146	18	23
Government	$0	$43,217	$0	$13,935	0	0
Other	$0	$1,065	$0	$1,065	0	0
TOTAL	**$1,702,906**	**$2,495,149**	**$640,062**	**$929,982**	**51**	**64**

Cowlitz County (continued)

Option 12 - Low Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$472	$0	$179	0	0
Mining	$0	$1	$0	$0	0	0
Construction	$0	$714	$0	$409	0	0
Manufacturing	$0	$723	$0	$196	0	0
Transport., Commun., Public Utilities	$0	$1,344	$0	$416	0	0
Trade	$19,797	$22,507	$7,555	$8,732	1	1
Finance, Insurance, Real Estate	$0	$3,223	$0	$457	0	0
Services	$10,612	$14,782	$3,875	$5,949	0	0
Government	$0	$772	$0	$249	0	0
Other	$0	$19	$0	$19	0	0
TOTAL	**$30,409**	**$44,557**	**$11,430**	**$16,606**	**1**	**1**

Option 12 - Low Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$9,446	$0	$3,578	0	0
Mining	$0	$18	$0	$6	0	0
Construction	$0	$14,271	$0	$8,186	0	0
Manufacturing	$0	$14,461	$0	$3,912	0	0
Transport., Commun., Public Utilities	$0	$26,873	$0	$8,326	0	0
Trade	$395,945	$450,152	$151,105	$174,642	12	13
Finance, Insurance, Real Estate	$0	$64,456	$0	$9,148	0	1
Services	$212,235	$295,631	$77,489	$118,980	6	8
Government	$0	$15,435	$0	$4,977	0	0
Other	$0	$381	$0	$380	0	0
TOTAL	**$608,180**	**$891,124**	**$228,594**	**$332,135**	**18**	**23**

Option 12 - High Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$850	$0	$322	0	0
Mining	$0	$2	$0	$1	0	0
Construction	$0	$1,284	$0	$737	0	0
Manufacturing	$0	$1,301	$0	$352	0	0
Transport., Commun., Public Utilities	$0	$2,419	$0	$749	0	0
Trade	$35,636	$40,515	$13,600	$15,718	1	1
Finance, Insurance, Real Estate	$0	$5,801	$0	$823	0	0
Services	$19,101	$26,607	$6,974	$10,708	1	1
Government	$0	$1,389	$0	$448	0	0
Other	$0	$34	$0	$34	0	0
TOTAL	**$54,737**	**$80,202**	**$20,574**	**$29,892**	**2**	**2**

Option 12 - High Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$17,003	$0	$6,440	0	0
Mining	$0	$33	$0	$11	0	0
Construction	$0	$25,689	$0	$14,735	0	0
Manufacturing	$0	$26,029	$0	$7,042	0	0
Transport., Commun., Public Utilities	$0	$48,371	$0	$14,987	0	0
Trade	$712,702	$810,276	$271,989	$314,357	22	24
Finance, Insurance, Real Estate	$0	$116,020	$0	$16,467	0	1
Services	$382,024	$532,138	$139,480	$214,165	11	15
Government	$0	$27,782	$0	$8,958	0	0
Other	$0	$685	$0	$685	0	0
TOTAL	**$1,094,726**	**$1,604,026**	**$411,469**	**$597,847**	**33**	**41**

Lewis County — Estimated Impacts

Option 6 - Low Traffic
(1% capture rate)

	Output		Labor Income		Employment	
Industry	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Agriculture	$0	$757	$0	$251	0	0
Mining	$0	$74	$0	$22	0	0
Construction	$0	$1,148	$0	$660	0	0
Manufacturing	$0	$1,260	$0	$246	0	0
Transport., Commun., Public Utilities	$0	$3,321	$0	$990	0	0
Trade	$31,675	$36,764	$11,850	$14,049	1	1
Finance, Insurance, Real Estate	$0	$4,469	$0	$693	0	0
Services	$16,979	$23,644	$6,051	$9,435	1	1
Government	$0	$1,289	$0	$401	0	0
Other	$0	$45	$0	$45	0	0
TOTAL	**$48,654**	**$72,771**	**$17,901**	**$26,792**	**2**	**2**

Option 6 - Low Traffic
(20% capture rate)

	Output		Labor Income		Employment	
Industry	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Agriculture	$0	$15,141	$0	$5,013	0	0
Mining	$0	$1,472	$0	$449	0	0
Construction	$0	$22,965	$0	$13,205	0	0
Manufacturing	$0	$25,205	$0	$4,925	0	0
Transport., Commun., Public Utilities	$0	$66,429	$0	$19,796	0	0
Trade	$633,513	$735,286	$237,015	$280,992	20	22
Finance, Insurance, Real Estate	$0	$89,386	$0	$13,858	0	1
Services	$339,576	$472,878	$121,010	$188,703	11	14
Government	$0	$25,781	$0	$8,022	0	0
Other	$0	$895	$0	$895	0	0
TOTAL	**$973,089**	**$1,455,438**	**$358,025**	**$535,858**	**31**	**38**

Option 6 - High Traffic
(1% capture rate)

	Output		Labor Income		Employment	
Industry	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Agriculture	$0	$1,325	$0	$439	0	0
Mining	$0	$129	$0	$39	0	0
Construction	$0	$2,009	$0	$1,155	0	0
Manufacturing	$0	$2,205	$0	$431	0	0
Transport., Commun., Public Utilities	$0	$5,813	$0	$1,732	0	0
Trade	$55,432	$64,337	$20,739	$24,587	2	2
Finance, Insurance, Real Estate	$0	$7,821	$0	$1,213	0	0
Services	$29,713	$41,377	$10,588	$16,511	1	1
Government	$0	$2,256	$0	$702	0	0
Other	$0	$78	$0	$78	0	0
TOTAL	**$85,145**	**$127,350**	**$31,327**	**$46,887**	**3**	**3**

Option 6 - High Traffic
(20% capture rate)

	Output		Labor Income		Employment	
Industry	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Agriculture	$0	$26,498	$0	$8,773	0	0
Mining	$0	$2,576	$0	$786	0	0
Construction	$0	$40,188	$0	$23,109	0	1
Manufacturing	$0	$44,108	$0	$8,619	0	0
Transport., Commun., Public Utilities	$0	$116,251	$0	$34,643	0	1
Trade	$1,108,647	$1,286,750	$414,775	$491,736	34	39
Finance, Insurance, Real Estate	$0	$156,425	$0	$24,251	0	1
Services	$594,259	$827,538	$211,768	$330,230	19	24
Government	$0	$45,117	$0	$14,038	0	0
Other	$0	$1,566	$0	$1,565	0	0
TOTAL	**$1,702,906**	**$2,547,017**	**$626,543**	**$937,750**	**54**	**67**

Lewis County (continued)

Option 12 - Low Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$473	$0	$157	0	0
Mining	$0	$46	$0	$14	0	0
Construction	$0	$718	$0	$413	0	0
Manufacturing	$0	$788	$0	$154	0	0
Transport., Commun., Public Utilities	$0	$2,076	$0	$619	0	0
Trade	$19,797	$22,977	$7,407	$8,781	1	1
Finance, Insurance, Real Estate	$0	$2,793	$0	$433	0	0
Services	$10,612	$14,778	$3,782	$5,897	0	0
Government	$0	$806	$0	$251	0	0
Other	$0	$28	$0	$28	0	0
TOTAL	**$30,409**	**$45,483**	**$11,189**	**$16,747**	**1**	**1**

Option 12 - Low Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$9,463	$0	$3,133	0	0
Mining	$0	$920	$0	$281	0	0
Construction	$0	$14,353	$0	$8,253	0	0
Manufacturing	$0	$15,753	$0	$3,078	0	0
Transport., Commun., Public Utilities	$0	$41,518	$0	$12,373	0	0
Trade	$395,945	$459,553	$148,134	$175,620	12	14
Finance, Insurance, Real Estate	$0	$55,866	$0	$8,661	0	0
Services	$212,235	$295,549	$75,631	$117,939	7	9
Government	$0	$16,113	$0	$5,014	0	0
Other	$0	$559	$0	$559	0	0
TOTAL	**$608,180**	**$909,647**	**$223,765**	**$334,911**	**19**	**24**

Option 12 - High Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$852	$0	$282	0	0
Mining	$0	$83	$0	$25	0	0
Construction	$0	$1,292	$0	$743	0	0
Manufacturing	$0	$1,418	$0	$277	0	0
Transport., Commun., Public Utilities	$0	$3,737	$0	$1,114	0	0
Trade	$35,636	$41,361	$13,333	$15,806	1	1
Finance, Insurance, Real Estate	$0	$5,028	$0	$780	0	0
Services	$19,101	$26,599	$6,807	$10,615	1	1
Government	$0	$1,450	$0	$451	0	0
Other	$0	$50	$0	$50	0	0
TOTAL	**$54,737**	**$81,870**	**$20,140**	**$30,143**	**2**	**2**

Option 12 - High Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$17,034	$0	$5,640	0	0
Mining	$0	$1,656	$0	$505	0	0
Construction	$0	$25,835	$0	$14,856	0	0
Manufacturing	$0	$28,355	$0	$5,541	0	0
Transport., Commun., Public Utilities	$0	$74,733	$0	$22,271	0	1
Trade	$712,702	$827,197	$266,641	$316,116	22	25
Finance, Insurance, Real Estate	$0	$100,559	$0	$15,590	0	1
Services	$382,024	$531,989	$136,137	$212,291	13	16
Government	$0	$29,004	$0	$9,025	0	0
Other	$0	$1,006	$0	$1,006	0	0
TOTAL	**$1,094,726**	**$1,637,368**	**$402,778**	**$602,841**	**35**	**43**

Skamania County — Estimated Impacts

Option 6 - Low Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$592	$0	$214	0	0
Mining	$0	$2	$0	$0	0	0
Construction	$0	$571	$0	$276	0	0
Manufacturing	$0	$469	$0	$140	0	0
Transport., Commun., Public Utilities	$0	$1,031	$0	$310	0	0
Trade	$31,675	$32,722	$11,476	$11,941	1	2
Finance, Insurance, Real Estate	$0	$3,253	$0	$474	0	0
Services	$16,979	$19,134	$6,487	$7,523	0	1
Government	$0	$1,883	$0	$421	0	0
Other	$0	$11	$0	$11	0	0
TOTAL	**$48,654**	**$59,668**	**$17,963**	**$21,310**	**2**	**2**

Option 6 - Low Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$11,832	$0	$4,283	0	0
Mining	$0	$34	$0	$8	0	0
Construction	$0	$11,418	$0	$5,515	0	0
Manufacturing	$0	$9,377	$0	$2,796	0	0
Transport., Commun., Public Utilities	$0	$20,620	$0	$6,210	0	0
Trade	$633,513	$654,460	$229,524	$238,819	29	29
Finance, Insurance, Real Estate	$0	$65,065	$0	$9,481	0	1
Services	$339,576	$382,672	$129,743	$150,450	8	10
Government	$0	$37,653	$0	$8,419	0	0
Other	$0	$213	$0	$216	0	0
TOTAL	**$973,089**	**$1,193,344**	**$359,267**	**$426,197**	**37**	**40**

Option 6 - High Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$1,035	$0	$375	0	0
Mining	$0	$3	$0	$1	0	0
Construction	$0	$999	$0	$483	0	0
Manufacturing	$0	$820	$0	$245	0	0
Transport., Commun., Public Utilities	$0	$1,804	$0	$543	0	0
Trade	$55,432	$57,265	$20,083	$20,897	3	3
Finance, Insurance, Real Estate	$0	$5,693	$0	$830	0	0
Services	$29,713	$33,484	$11,353	$13,164	1	1
Government	$0	$3,295	$0	$737	0	0
Other	$0	$19	$0	$19	0	0
TOTAL	**$85,145**	**$104,417**	**$31,436**	**$37,294**	**3**	**4**

Option 6 - High Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$20,706	$0	$7,496	0	0
Mining	$0	$59	$0	$13	0	0
Construction	$0	$19,981	$0	$9,657	0	0
Manufacturing	$0	$16,410	$0	$4,893	0	0
Transport., Commun., Public Utilities	$0	$36,084	$0	$10,867	0	0
Trade	$1,108,647	$1,145,304	$401,666	$417,933	50	51
Finance, Insurance, Real Estate	$0	$113,864	$0	$16,591	0	1
Services	$594,259	$669,676	$227,050	$263,287	15	17
Government	$0	$65,893	$0	$14,734	0	0
Other	$0	$378	$0	$378	0	0
TOTAL	**$1,702,906**	**$2,088,355**	**$628,716**	**$745,849**	**65**	**71**

Skamania County (continued)

Option 12 - Low Traffic (1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$370	$0	$134	0	0
Mining	$0	$1	$0	$0	0	0
Construction	$0	$357	$0	$172	0	0
Manufacturing	$0	$293	$0	$87	0	0
Transport., Commun., Public Utilities	$0	$644	$0	$194	0	0
Trade	$19,797	$20,452	$7,173	$7,463	1	1
Finance, Insurance, Real Estate	$0	$2,033	$0	$296	0	0
Services	$10,612	$11,959	$4,055	$4,702	0	0
Government	$0	$1,177	$0	$263	0	0
Other	$0	$7	$0	$7	0	0
TOTAL	**$30,409**	**$37,293**	**$11,228**	**$13,318**	**1**	**1**

Option 12 - Low Traffic (20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$7,395	$0	$2,677	0	0
Mining	$0	$21	$0	$5	0	0
Construction	$0	$7,136	$0	$3,449	0	0
Manufacturing	$0	$5,861	$0	$1,748	0	0
Transport., Commun., Public Utilities	$0	$12,887	$0	$3,881	0	0
Trade	$395,945	$409,037	$143,452	$149,261	18	18
Finance, Insurance, Real Estate	$0	$40,666	$0	$5,925	0	0
Services	$212,235	$239,170	$81,089	$94,031	5	6
Government	$0	$23,533	$0	$5,262	0	0
Other	$0	$135	$0	$135	0	0
TOTAL	**$608,180**	**$745,841**	**$224,541**	**$266,374**	**23**	**25**

Option 12 - High Traffic (1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$666	$0	$241	0	0
Mining	$0	$2	$0	$0	0	0
Construction	$0	$642	$0	$310	0	0
Manufacturing	$0	$527	$0	$157	0	0
Transport., Commun., Public Utilities	$0	$1,160	$0	$349	0	0
Trade	$35,636	$36,814	$12,911	$13,434	2	2
Finance, Insurance, Real Estate	$0	$3,660	$0	$533	0	0
Services	$19,101	$21,525	$7,298	$8,463	1	1
Government	$0	$2,118	$0	$474	0	0
Other	$0	$12	$0	$12	0	0
TOTAL	**$54,737**	**$67,126**	**$20,209**	**$23,973**	**2**	**2**

Option 12 - High Traffic (20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$13,311	$0	$4,819	0	0
Mining	$0	$38	$0	$9	0	0
Construction	$0	$12,845	$0	$6,208	0	0
Manufacturing	$0	$10,549	$0	$3,146	0	0
Transport., Commun., Public Utilities	$0	$23,197	$0	$6,986	0	0
Trade	$712,702	$736,267	$258,214	$268,671	32	33
Finance, Insurance, Real Estate	$0	$73,198	$0	$10,666	0	1
Services	$382,024	$430,507	$145,961	$169,256	10	11
Government	$0	$42,360	$0	$9,472	0	0
Other	$0	$243	$0	$243	0	0
TOTAL	**$1,094,726**	**$1,342,515**	**$404,175**	**$479,476**	**42**	**45**

Yakima County — Estimated Impacts

Option 6 - Low Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$734	$0	$199	0	0
Mining	$0	$8	$0	$0	0	0
Construction	$0	$1,149	$0	$615	0	0
Manufacturing	$0	$2,118	$0	$411	0	0
Transport., Commun., Public Utilities	$0	$3,362	$0	$1,009	0	0
Trade	$31,675	$37,728	$11,845	$14,438	1	1
Finance, Insurance, Real Estate	$0	$5,459	$0	$860	0	0
Services	$16,979	$25,067	$6,233	$10,218	1	1
Government	$0	$718	$0	$338	0	0
Other	$0	$43	$0	$43	0	0
TOTAL	**$48,654**	**$76,386**	**$18,078**	**$28,131**	**2**	**2**

Option 6 - Low Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$14,672	$0	$3,985	0	0
Mining	$0	$150	$0	$7	0	0
Construction	$0	$22,980	$0	$12,298	0	0
Manufacturing	$0	$42,352	$0	$8,221	0	0
Transport., Commun., Public Utilities	$0	$67,249	$0	$20,175	0	1
Trade	$633,513	$754,576	$236,916	$288,769	20	22
Finance, Insurance, Real Estate	$0	$109,178	$0	$17,208	0	1
Services	$339,576	$501,337	$124,667	$204,359	10	13
Government	$0	$14,365	$0	$6,760	0	0
Other	$0	$870	$0	$870	0	0
TOTAL	**$973,089**	**$1,527,729**	**$361,583**	**$562,652**	**29**	**38**

Option 6 - High Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$1,284	$0	$349	0	0
Mining	$0	$13	$0	$1	0	0
Construction	$0	$2,011	$0	$1,076	0	0
Manufacturing	$0	$3,706	$0	$719	0	0
Transport., Commun., Public Utilities	$0	$5,884	$0	$1,765	0	0
Trade	$55,432	$66,025	$20,730	$25,267	2	2
Finance, Insurance, Real Estate	$0	$9,553	$0	$1,506	0	0
Services	$29,713	$43,867	$10,908	$17,881	1	1
Government	$0	$1,257	$0	$592	0	0
Other	$0	$76	$0	$76	0	0
TOTAL	**$85,145**	**$133,676**	**$31,638**	**$49,232**	**3**	**3**

Option 6 - High Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$25,677	$0	$6,974	0	0
Mining	$0	$263	$0	$12	0	0
Construction	$0	$40,214	$0	$21,522	0	1
Manufacturing	$0	$74,116	$0	$14,387	0	0
Transport., Commun., Public Utilities	$0	$117,686	$0	$35,307	0	1
Trade	$1,108,647	$1,320,508	$414,602	$505,345	34	39
Finance, Insurance, Real Estate	$0	$191,062	$0	$30,114	0	1
Services	$594,259	$877,341	$218,168	$357,629	17	23
Government	$0	$25,139	$0	$11,830	0	0
Other	$0	$1,522	$0	$1,522	0	0
TOTAL	**$1,702,906**	**$2,673,528**	**$632,770**	**$984,642**	**51**	**66**

Yakima County (continued)

Option 12 - Low Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$459	$0	$125	0	0
Mining	$0	$5	$0	$0	0	0
Construction	$0	$718	$0	$384	0	0
Manufacturing	$0	$1,323	$0	$257	0	0
Transport., Commun., Public Utilities	$0	$2,102	$0	$630	0	0
Trade	$19,797	$23,580	$7,404	$9,024	1	1
Finance, Insurance, Real Estate	$0	$3,412	$0	$538	0	0
Services	$10,612	$15,667	$3,896	$6,386	0	0
Government	$0	$449	$0	$211	0	0
Other	$0	$27	$0	$27	0	0
TOTAL	**$30,409**	**$47,742**	**$11,300**	**$17,582**	**1**	**1**

Option 12 - Low Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$9,170	$0	$2,491	0	0
Mining	$0	$94	$0	$4	0	0
Construction	$0	$14,362	$0	$7,686	0	0
Manufacturing	$0	$26,470	$0	$5,138	0	0
Transport., Commun., Public Utilities	$0	$42,031	$0	$12,610	0	0
Trade	$395,945	$471,610	$148,072	$180,480	12	14
Finance, Insurance, Real Estate	$0	$68,236	$0	$10,755	0	1
Services	$212,235	$313,336	$77,917	$127,724	6	8
Government	$0	$8,978	$0	$4,225	0	0
Other	$0	$544	$0	$544	0	0
TOTAL	**$608,180**	**$954,831**	**$225,989**	**$351,657**	**18**	**24**

Option 12 - High Traffic
(1% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$825	$0	$224	0	0
Mining	$0	$8	$0	$0	0	0
Construction	$0	$1,293	$0	$692	0	0
Manufacturing	$0	$2,382	$0	$462	0	0
Transport., Commun., Public Utilities	$0	$3,783	$0	$1,135	0	0
Trade	$35,636	$42,446	$13,327	$16,244	1	1
Finance, Insurance, Real Estate	$0	$6,141	$0	$968	0	0
Services	$19,101	$28,200	$7,012	$11,495	1	1
Government	$0	$808	$0	$380	0	0
Other	$0	$49	$0	$49	0	0
TOTAL	**$54,737**	**$85,935**	**$20,339**	**$31,649**	**2**	**2**

Option 12 - High Traffic
(20% capture rate)

Industry	Output		Labor Income		Employment	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	$0	$16,507	$0	$4,484	0	0
Mining	$0	$169	$0	$8	0	0
Construction	$0	$25,852	$0	$13,835	0	0
Manufacturing	$0	$47,646	$0	$9,249	0	0
Transport., Commun., Public Utilities	$0	$75,655	$0	$22,697	0	1
Trade	$712,702	$848,898	$266,530	$324,865	22	25
Finance, Insurance, Real Estate	$0	$122,826	$0	$19,359	0	1
Services	$382,024	$564,006	$140,251	$229,904	11	15
Government	$0	$16,161	$0	$7,605	0	0
Other	$0	$978	$0	$978	0	0
TOTAL	**$1,094,726**	**$1,718,698**	**$406,781**	**$632,984**	**33**	**43**

Washington State — Estimated Impacts (Highest and Lowest Only)

Option 12 - Low Traffic

(1% capture rate)	Output		Labor Income		Employment	
Industry	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Agriculture	$0	$679	$0	$187	0	0
Mining	$0	$20	$0	$4	0	0
Construction	$0	$821	$0	$457	0	0
Manufacturing	$0	$2,654	$0	$502	0	0
Transport., Commun., Public Utilities	$0	$2,130	$0	$677	0	0
Trade	$19,797	$24,035	$7,712	$9,542	1	1
Finance, Insurance, Real Estate	$0	$4,636	$0	$834	0	0
Services	$10,612	$17,304	$4,111	$7,541	0	0
Government	$0	$1,046	$0	$325	0	0
Other	$0	$23	$0	$23	0	0
TOTAL	**$30,409**	**$53,348**	**$11,823**	**$20,092**	**1**	**1**

Option 6 - High Traffic

(20% capture rate)	Output		Labor Income		Employment	
Industry	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Agriculture	$0	$37,998	$0	$10,449	0	1
Mining	$0	$1,121	$0	$204	0	0
Construction	$0	$45,960	$0	$25,584	0	1
Manufacturing	$0	$148,646	$0	$28,139	0	1
Transport., Commun., Public Utilities	$0	$119,273	$0	$37,919	0	1
Trade	$1,108,647	$1,345,992	$431,890	$534,333	31	36
Finance, Insurance, Real Estate	$0	$259,596	$0	$46,731	0	2
Services	$594,259	$969,004	$230,238	$422,304	13	20
Government	$0	$58,577	$0	$18,226	0	0
Other	$0	$1,290	$0	$1,290	0	0
TOTAL	**$1,702,906**	**$2,987,457**	**$662,128**	**$1,125,179**	**45**	**61**